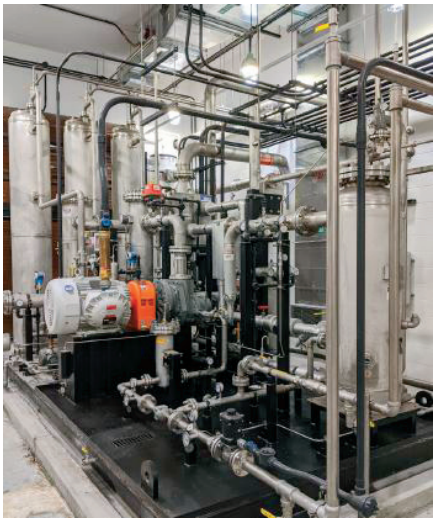
BIOGAS RECLAMATION: PULLING ENERGY OUT OF THIN AIR

By Jacob Gardner

A few years ago, in an article about Net-Zero Energy Consumption, I said, "a third technique for achieving net zero energy consumption that in my time with NYRWA I have not yet seen: producing energy from the waste itself. This includes the process of harvesting biogases and either selling them or using them to power some functions of the facility."

While I had not witnessed it myself, several wastewater treatment facilities throughout the state are in fact harvesting and using bio gas extracted from anerobic treatment processes to create heat and electricity. I was alerted to a few: the Lewiston, Jamestown, Ithaca, and Oneida County treatment facilities; there are undoubtably more. It seems a fitting time to dive a little deeper into how harvesting biogas can help your system reach its energy efficiency goals.

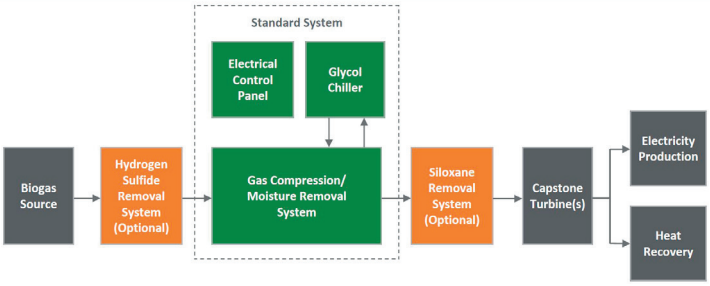


Biogas is created during anerobic digestion as microorganisms break down organic materials without the presence of air. The gas produced is mostly Methane (CH4) and Carbon Dioxide (CO2) with small amounts of water vapor and other gasses. Methane is the primary component of natural gas and can be stripped away from the other gasses. (1) The process also creates digestate (sludge) that is rich in nutrients. After stripping the water from the digestate and adding woodchips, air, and time, you can create valuable compost.

Biogas is a renewable energy source that can be used to: power engines, fuel boilers, produce heat and electricity, and in some cases be cleaned an upgraded to produce compressed or liquefied natural gas. But how do you harness this gas and turn it into useful energy for your system?

First, the gas is collected and delivered to a Turbine Gas Conditioning System. In the conditioning system, biogas is compressed while moisture and particulates are removed by filtering, chilling, and reheating. If other compounds are present in the gas, it then enters compound specific filters. Once conditioned and filtered, the gas can be delivered to a turbine for combustion that produces recoverable heat and electricity.

Turbine Gas Conditions System Diagram



The electricity produced can either be sold into the electric grid to offset your electric costs or used onsite to reduce your system's electric consumption. And the heat can be used to keep your facilities warm during the New York winter. The gas can also be further processed to a form that can be used to power natural gas vehicles or be sold into a natural gas pipeline.

In terms of energy efficiency, optimizing the byproducts of your treatment process can be just as impactful as optimizing the treatment process itself. The biogas combined heat and power system at the Oneida County Water Pollution Control Plant is currently generating 50 to 60% of the plant's electrical needs and the system was furnished by a single provider using funding from the New York State Energy Research and Development Authority (NYSERDA). If your system utilizes anerobic digestors, it may be time to see how your system could start harnessing the power of your byproducts and start pulling your electric supply out of thin air.

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Works Cited

1. Basic Information about Anaerobic Digestion (AD). https://www.epa.gov/anaerobic-digestion/basic-information-about-anaerobic-digestion-ad

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